Chapter 9
Separator BMPs

A number of devices, structures and systems are available for providing varying levels of pretreatment of stormwater before it enters a BMP. These range from the relatively simple modified catch basin (catch basin with a sump and oil trap) to the sophisticated (and expensive) coalescing plate oil separator. The devices discussed in this Chapter include:

- Water Quality Inlet
- Oil/Grit and Oil/Water Separator
- Proprietary Systems

9.1 Water Quality Inlet

9.1.1 Description

IMPORTANT

Water quality inlets are generally deep sump catch basins with the outlet fitted with a hood. They are used to remove coarse sediments and hydrocarbons from stormwater runoff. They are most appropriate as pretreatment structures for other types of water quality BMPs.

The water quality inlet is a conventional stormwater drainage structure (catch basin) provided with a sump and a hood. The sump is intended to trap coarse sediment and non-floating debris. The hood is intended to prevent floating debris and floating hydrocarbons from exiting the catch basin. Figure 9-1 shows a typical water quality inlet with hood.

High flow events can result in mixing within the basin and resuspension of accumulated sediment, so the contributing watershed should be kept relatively small. Also, size limits on commercially available hood castings limit the allowable size of the outlet pipe from the catch basin.

Catch basins are useful in limiting the volume of debris and coarse sediment that may be conveyed to another stormwater management facility and should be considered as a component of an overall

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piped drainage system, as a relatively low cost device for intercepting coarse sediment and debris that would otherwise consume available capacity or clog the pipe network or downstream management facilities. Existing catch basins may be readily modified, in some instances, to retrofit an existing system to intercept coarse sediment and floating debris.

9.1.2 Design Criteria

The following design criteria should be followed at a minimum:

1. **Sump:** A water quality inlet should be provided with a four foot (minimum) sump to collect sediments. Larger sumps should be provided in areas to receive heavy sanding or where a heavy sediment load is anticipated.

2. **Hood:** Hood dimensions are generally determined by pipe size, and are commercially available through a number of vendors as stock items. They typically use a cover, an elbow or tee with the inlet of the fitting pointed toward the floor of the basin. However, it must be properly vented to allow the basin to drain. A vent must extend to above the anticipated high water level within the basin, so that floating material does not overflow the fitting and exit the basin. A threaded cap should also be placed in-line with the pipe for cleaning access.

9.1.3 Maintenance

Regular maintenance is imperative to remove the sediment from the sump and any floating debris and products for the continuity of the effectiveness of the structure. When sediments are visible at the bottom of the outlet pipe, the sump is full and needs cleaning.

1. **Inspection:** Water quality inlets should be inspected three to four times annually, depending on their performance.

2. **Sediment Removal:** Sediment should be removed when it accumulates within 6 inches of the bottom of the hood, but not less than twice a year.

Selected References

Schueler, T.R. 1987. *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs.* Metropolitan Washington Council of Governments, Washington DC.

Schueler, T.R, P.A. Kumble, and M.A. Heraty. 1992b. *A Current Assessment of Urban Best Management Practices: Techniques for Reducing Nonpoint Source Pollution in the Coastal Zone.* Metropolitan Washington Council of Governments, Washington, D.C.

9.2 Oil/Grit and Oil/Water Separators

9.2.1 Description

IMPORTANT

Oil/grit and oil/water separators are used to remove coarse sediments and hydrocarbons from stormwater runoff. They are most appropriate as pretreatment structures for other types of water quality BMPs.

Oil/grit separators are chambers designed to remove sediment and hydrocarbons from urban runoff and are also effective for removing floating trash from runoff. They are normally used close to the source before pollutants are conveyed to storm sewers or as pretreatment for other BMPs such as infiltration trenches. Oil/grit separators are typically used in areas with heavy traffic or high potential for petroleum spills such as parking lots, gas stations, roads, and loading areas.

Runoff is only detained briefly in conventional oil/grit separators, so only moderate removal of coarse sediments, oil, and grease can be expected. Even more limited removal is likely for fine-grained sediment and pollutants attached to the sediment, such as trace metals and nutrients. Soluble pollutants will most likely pass through oil/grit separators.

The use of an oil/grit separator to pre-treat flows of stormwater runoff ahead of structural BMPs, i.e. as a "forebay", can provide economic and environmental benefits. The structures are easily accessible and can be located underground, minimizing valuable space. However, the structures have limited pollutant removal capability and require frequent cleanout.

9.2.2 Design Criteria

A typical oil/grit or oil/water separator (Figure 9-2) has two chambers. Runoff enters the first chamber, which contains a permanent pool of water. Coarse sediment is trapped in this chamber by settling. The first chamber can also trap floating trash and debris, such as leaves.

Runoff then passes through an orifice to the second chamber which also contains a permanent pool of water. An inverted pipe elbow which draws water from the lower part of the pool discharges to the storm drainage system. By drawing water from below the surface, floating oil and grease are trapped. Some hydrocarbons may become adsorbed to sediment particles which settle out.

The following provides some guidance on oil/grit or oil/water separator design:

1. **Pool Storage:** In order for the structure to provide even moderate pollutant removal benefits, at least 400 cubic feet of permanent pool storage should be provided per acre of drainage area (MPCA). Also, the pool should be at least 4 feet deep.

2. **Access:** Manhole access should be provided to each chamber to allow for cleaning.

There are several proprietary oil/grit and oil/water separator devices available and the designer is encouraged to investigate alternative designs that may be applicable to the treatment or pre-treatment of stormwater. For selection and design of proprietary oil/grit separator devices, refer to the product literature for these structures.

9.2.3 Maintenance

In order to have any effectiveness for pollutant removal, oil/grit separators are very dependent on the regular and frequent clean-out of trapped sediments. Oil/grit separators should be cleaned out at least twice a year in order to maintain their pollutant removal capabilities. Failure to clean them out on a regular basis can result in mixing of floating hydrocarbons into the water column and resuspension and loss of previously trapped

material. The designer should consult the Maine DEP Bureau of Hazardous Materials and Solid Waste Control to determine options for disposal of the oil-contaminated water sediment and slurry that will be removed during cleaning prior to the installation of these devices at a site.

Selected References

Schueler, T.R. 1987. *Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs.* Metropolitan Washington Council of Governments, Washington DC.

Schueler, T.R, P.A. Kumble, and M.A. Heraty. 1992b. *A Current Assessment of Urban Best Management Practices: Techniques for Reducing Nonpoint Source Pollution in the Coastal Zone.* Metropolitan Washington Council of Governments, Washington, D.C.

9.3 Proprietary Systems

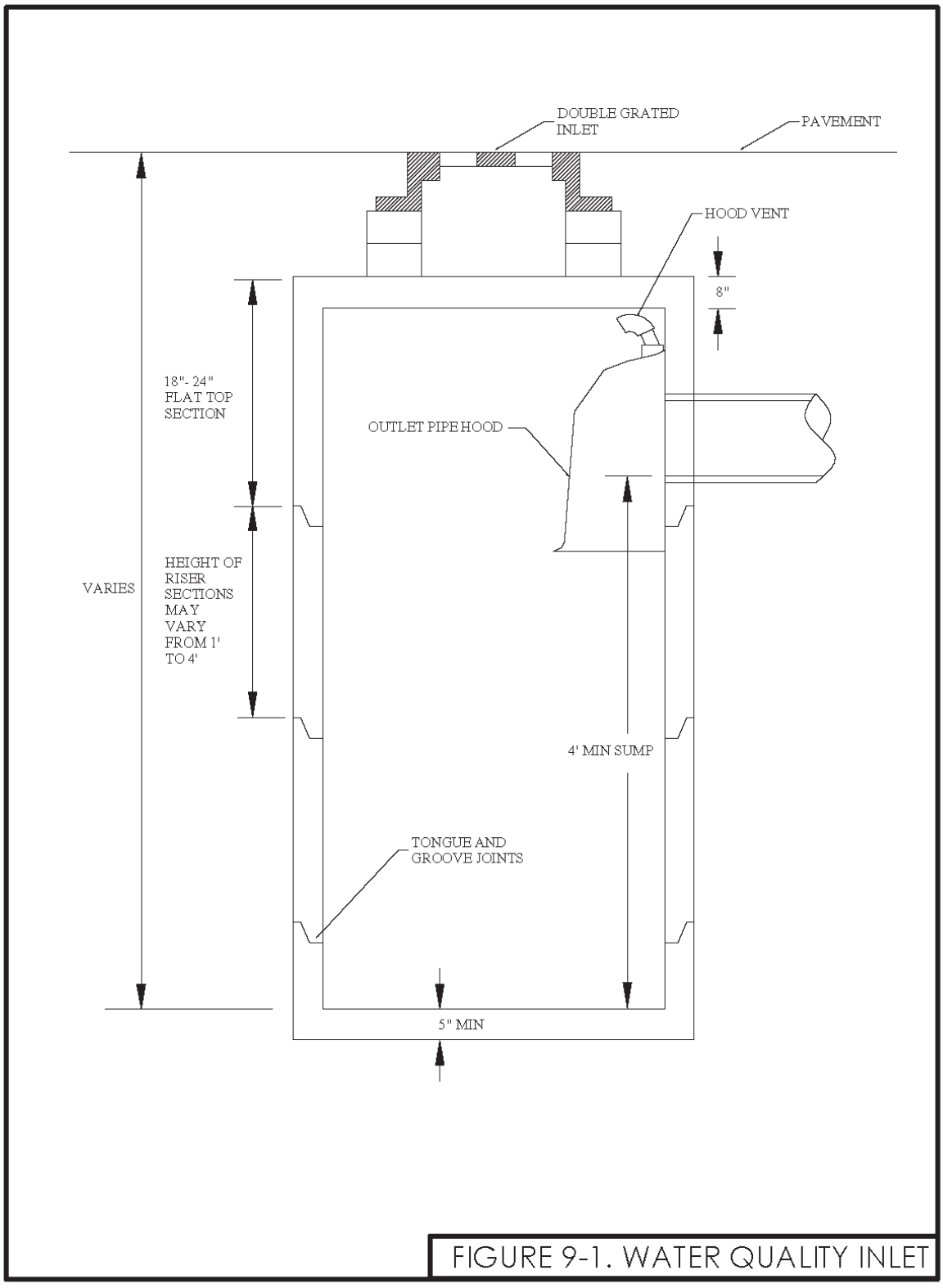

FIGURE 9-1. WATER QUALITY INLET

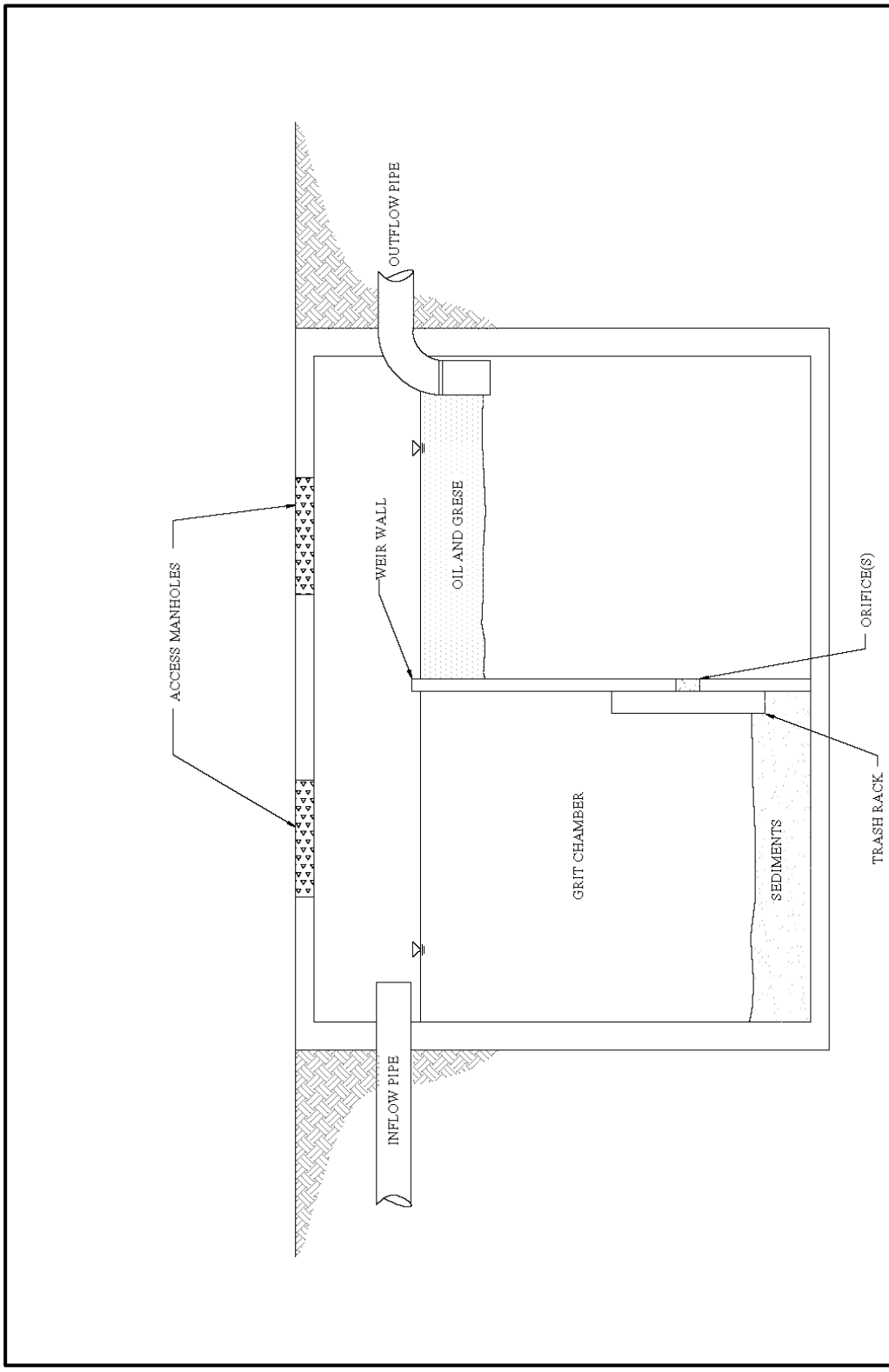

FIGURE 9-2. TYPICAL OIL/GRIT SEPARATOR